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赤道太平洋域から初めて得られた 23-41 Ma における相対的地磁気強度変動記録
First 23-41 Ma relative geomagnetic paleointensity records in the equatorial Pacific

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In order to reveal the earth's history, in particular the evolution of the earth's outer core, it is inevitable to investigate the intensity of the paleomagnetic field, namely, geomagnetic paleointensity. Paleointensity can be recovered independently from volcanic rocks and marine sediments. Volcanic rocks give absolute paleointensity sporadically in time, and a number of data have been reported back to as old as ~ 3.5 Ga according to the latest database (PINT database updated on August 2012; after Biggin et al., 2010). In contrast, marine sediments provide relative paleointensity (RPI) continuously in time, and stacked time series have been published only back to ~ 3 Ma (e.g. PISO-1500 record for the last 1500 kyr, Channell et al., 2009; Sint-2000 record and PADM2M model for the last 2000 kyr, Valet et al., 2005, Ziegler et al., 2011; EPAPIS-3Ma record for the last 800-3000 kyr, Yamazaki and Oda, 2005). Obtaining RPI records further back in time is an important subject in earth science.

Integrated Ocean Drilling Program (IODP) Expedition 320/321 recovered sedimentary sections at Sites U1331 and U1332 from the equatorial Pacific. We conduct paleomagnetic and rock magnetic measurements on the Sites U1331 and U1332 sediments to recover first Oligocene and Eocene RPI records in the equatorial Pacific. The sedimentary sections extend mainly from the late Oligocene to the late Eocene for Site U1331 (29.166-41.358 Ma), and from the early Oligocene to the late Eocene for Site U1332 (23.030-41.358 Ma). They are precious materials for RPI studies, as there have been only one RPI record reported so far which covers the Oligocene period (Deep Sea Drilling Project (DSDP) Site 522 record from South Atlantic; Hartl et al., 1993; Tauxe and Hartl, 1997).

Our measurements revealed that the main magnetic carriers are low-temperature oxidized magnetites and variations of their concentration are within about a factor of six. When the sedimentary sections are divided into Oligocene (23.0-33.7 Ma) and Eocene (34.5-41.4 Ma) intervals, ratios of anhysteretic to saturation isothermal remanent magnetization do not vary large. RPI is estimated separately for each interval.

In both the Sites U1331 and U1332 RPI records, it is recognized that chron boundaries always associate with intensity minima. The records also show cyclic highs and lows even during stable polarity periods. These features are the same as those reported for the last 3 million year RPI records. The probable cryptochron C18n.1n-1, which is characterized by common marked intensity lows in the RPI records, is found at the age of 39.094-39.114 Ma for Site U1331 and 38.958-38.983 Ma for Site U1332.

The two records show consistent variation with the RPI reported from Site U1333, which is in the vicinity of Sites U1331 and U1332. They can be reasonably correlated with the RPI record reported from DSDP Site 522 in South Atlantic (After Hartl et al. (1993) and Tauxe and Hartl (1997)). One interesting feature is that the RPI during the chron C12r appears to be consistently high compared with that during other Oligocene intervals. Further investigations based on new records are necessary in the future to make conclusion whether or not this is a true manifestation of the ancient geomagnetic field.